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NOTE.—*The application for a Patent has become void.*

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PATENT SPECIFICATION

Convention Date (Germany): Aug. 19, 1929. **367,751**

Application Date (in United Kingdom): Aug. 19, 1930. No. 24,828/30.

Complete not Accepted.

COMPLETE SPECIFICATION.

An Improved Process for Utilising Oil Seed Cakes.

I, Dr. ANDRÉ PHILIPPOU, of Boulevard Sultan Hussein 7, Alexandria, Egypt, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

It is well known to saccharify wood and cellulose waste, such as straw and the like, by disintegration with acids and to convert the sugar solution obtained into alcohol by fermentation. According to the present invention, this known process is made use of in order to effect an advantageous utilisation of oil seed cakes (cotton seeds, olive seeds, and the like). A fodder, fermentable sugar material and ethyl alcohol are obtained thereby. Further, the defatted residues from the oil seed cakes are rendered useful in a similar manner.

First of all a meal is obtained by drying, grinding finely, and sieving, which contains the bulk of the albuminous materials and fatty bodies and a part of the starchy substances. Thanks to its nutritive value and owing to the fact that it is free from raw fibre, this meal may be advantageously used as an animal fodder either alone or in admixture with other feeding means. The residues remaining behind after sieving contain starchy and cellulose substances. Both may be saccharified in the known manner, the residues being heated under pressure with mineral acid of medium strength. However, the starch content is high enough in order to justify economically its separate conversion into dextrose and various kinds of sugar. For example, average analyses for the residues obtained after sieving in the case of cotton seed showed a content of 20.45% of starch with the following total composition.

[*Price 1/-*]

Water - - -	7.8%
Raw fibre - - -	46.01%
Ash - - - -	3.82%
Crude fat - - -	1.72%
Raw protein - - -	6.68%
Extract substances free from nitrogen - -	33.97%

In order to saccharify the starch the residues are either subjected to the diastatic action of enzymes or they are heated in autoclaves with weak acids. The extraction of the sugar substances is effected in diffusion batteries, and produces a yield of 14—15%.

The residues which remain behind in the straining vat or in the autoclave, contain about 46% of cellulose compounds. These may be partly disintegrated by heating with strong mineral acids (sulphuric acid, sulphurous acid, hydrochloric acid) at raised pressure and converted into alcohol by fermentation. The yield amounts to 6—8%.

If all the fermentable sugar material is to be converted into alcohol, the solutions obtained by disintegrating the starchy portions and the cellulosic portions are united, neutralised by addition of lime until only a weak acid reaction is shown, and the precipitate allowed to settle. The clear solution is then fermented after addition of yeast. The yeast is first of all grown in a malt extract and then acclimatised by gradual addition of the sugar solutions obtained above. By distillation of the mash a mixture is finally obtained which contains mainly ethyl alcohol, together with methyl alcohol, acetone, aldehyde, and so forth.

As already mentioned the saccharification of cellulosic waste material is not in itself new. The important point of the present invention, however, is the advantageous combination of all the steps for

utilising the substances contained in the oil seed cakes. Each step of the process stands in favourable mutual relationship with the remaining steps. For the thorough disintegration of the cellulosic substances in the third stage, the fine grinding of the initial material, which was effected in the first stage from the point of view of obtaining an animal fodder meal, is essential. Further this disintegration of the cellulose is prepared for and facilitated by the previous saccharification of the starch in the second stage, particularly if this is effected by means of acid in an autoclave. On the other hand, in the third stage, starch substances are disintegrated which have not been attacked in the second operation. Finally, by the combination of the sugar solutions of the second and third stages, an average quality is obtained for the sugar solution such as is necessary for the development of the yeast in order to ensure a fermentation which proceeds normally.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A process for utilising oil seed cakes, characterised by the feature that the dried cakes are finely ground and a meal, which serves as a fodder, is separated off by sieving, whilst the residue which contains starch and cellulose is saccharified in the known manner by heating with acids.

2. A process as claimed in claim 1, characterised by the feature that the saccharification of the residues is effected in two stages, firstly the saccharification of the starch bodies by the diastatic action of enzymes, or by heating with weak acids in an autoclave, and then the saccharification of the cellulosic materials by heating with strong acids under raised pressure.

3. A process as claimed in claim 2, characterised by the feature that the sugar solutions obtained in the two saccharification stages are combined, neutralised by addition of lime, clarified, fermented in order to form alcohol, and distilled.

4. The improved process for utilising oil seed cakes, substantially as hereinbefore set forth.

Dated this 18th day of August, 1930.

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